

created by the book is a good one and the editor must be congratulated on the generally high quality of the complete work.

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X-ray diffraction. By B. E. WARREN. Pp. vii + 381.
New York: Addison Wesley, 1968. Price £ 7.70.

Professor Warren has been an exponent of X-ray diffraction practically for the whole period of the existence of the subject; he worked with Professor W. L. Bragg in the early days at Manchester, and one of the materials on which he worked – chrysotile, which gives a mixture of sharp and diffuse layer lines – must have coloured his whole research outlook. From then he became less interested in ordinary crystal structures and devoted himself more to the study of imperfections, including the most imperfect of all solids, the glasses. This, in fact, is the general theme of this book. The title is really too general, and it would have been more satisfactory if it had shown the specialist interests of the author.

The first four chapters form a general introduction to diffraction by crystals. Then come five chapters on practical matters – the powder method, the Laue method, the rotation method, space groups and Fourier series – and these are the least satisfactory chapters in the book. They are too short to be really useful and comprehensive, and give the impression of being rather old-fashioned. The only method described for analysing powder photographs is the Hull-Davey chart; the Weissenberg method is briefly dealt with and the precession method is merely mentioned. Space groups are discussed with respect to one particular example – *Cmcm* – but the treatment is not clear, the diagram does not agree with that in *International Tables for X-ray Crystallography*, and the symbols for the mirror planes and glide planes are not correctly drawn. The treatment of crystal structures is illustrated by the structure of uranium; this, with only one variable parameter, can hardly be considered as typical of the present state of the subject.

From this point on, however, the author comes into his own. The chapters on non-crystalline matter, on temper-

ature effects, on order-disorder, and on imperfect crystals bear the stamp of authority, and it is clear that this part of the book, and the last chapter on perfect-crystal theory, will form a standard work that many X-ray diffractionists will be glad to refer to. A great part of this work is culled from James's *Optical Principles of the Diffraction of X-rays* and Warren pays tribute to the part that this book has played in influencing his ideas. The difference, of course, is that James's work was essentially theoretical; Warren is describing work in which he has himself played a leading part.

Warren's book is also more up-to-date. He devotes considerable space to the Bormann effect, in which standing waves can pass through considerable thickness of crystal without absorption. This effect has been responsible for some fascinating experiments in X-ray interference, bringing within the range of possibility the measurement of X-ray wavelengths by the Michelson interferometer.

The book is considerably mathematical and must have imposed a severe strain on the students for whom the course was devised. The treatments are, however, lightened by the occasional flash of physical insight, which gives the less mathematical reader some understanding of what the theories really mean. For example, the limitation of the vectors in reciprocal space representing possible elastic waves is clearly described; so is the broadening of peaks by temperature motion – which is different from what many people imagine; and the physical implications of Bormann's discovery are also clearly discussed.

To summarize, then, there is no doubt that this will be a useful book to add to the existing library of the X-ray crystallographer. It would, however, be better if the title were more indicative of the contents and if the author would face boldly the fact that the ordinary crystallographic chapters are not needed. The index also should be improved; it consists largely of proper names, and many subjects – for example, anomalous scattering and monotonic scattering – cannot be found under these headings. It is hoped that a second edition will try to remedy these defects.

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